

REMARKS

Reconsideration of this application in light of the amendments and following remarks is respectfully requested.

Status of the Claims

Claims 1 and 3-4 are pending in the application.

Claim 1 has been amended.

No new matter has been added.

Claims 2 and 5-8 were previously canceled without prejudice or disclaimer of the subject matter therein.

Rejections Under 35 U.S.C § 103

Claims 1, 3 and 4 are rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,725,932 to Iio et al. (“Iio”) in view of the Examiner’s statement of ordinary skill in the art. The Examiner contends that the ranges, by percent weight, of the cemented carbide claimed in the present application overlap that of the substrate disclosed by Iio. Applicant respectfully traverses these rejections.

Iio describes a substrate formed from a WC-based cemented carbide. (See Iio, Column 2, Lines 43-57). The substrate contains 2-15 wt% Co and/or Ni as a binding phase; and 0.2-20 wt% Ti and Ta. (See Iio, Column 7, Lines 55 – 60). The substrate contains at least one of a W-Ti-C solid solution (β -phase) and a W-Ti-Ta-C solid solution (βt -phase). (See Iio, Column 7, Lines 63 – 65). Ta may be replaced entirely or in part by Nb in the substrate. (See Iio, Column 8, Lines 22-23).

Independent claim 1 is amended to recite that the “ βt solid solution comprises: TiC; TiN; Ta carbonitride; and Nb carbonitride.” Support for this amendment may be found in the Specification, for example, at page 8, line 25 – page 9, line 3 and in Table 1. It is respectfully submitted that Iio does not teach or suggest the above-recited features of amended claim 1. The substrate of Iio contains at least one of a W-Ti-C solid solution (β -phase) and a W-Ti-Ta-C solid solution (βt -

phase). (See Iio, Column 7, Lines 63 – 65). Thus, the substrate of Iio does not include each of TiC, TiN, TaC and NbC as indispensable components of the β t solid solution. Further Iio does not include any example in which TiC, TiN, TaC and NbC are all included in the β t solid solution forming a hard phase of the substrate. (See Iio, Tables 1 and 4). Thus, for at least this reason, Iio cannot render amended claim 1 obvious.

Further, Independent claim 1, recites that the “total content of Ta carbonitride and Nb carbonitride is in a range of 5 to 7 wt%,” and “a Nb content D_{Nb} and a Ta content D_{Ta} in said β t solid solution satisfy a relational expression of $D_{Nb}/(D_{Nb}+D_{Ta}) \geq 0.7$.” The total content of Ta, Nb carbonitrides and the ratio of $D_{Nb}/(D_{Nb}+D_{Ta})$ are determined to improve wear resistance during cutting operations at high cutting speed. (See Specification, Page 7, Lines 11-14). It is respectfully submitted that Iio does not teach or suggest the above-recited features of independent claim 1. Although Iio discloses that Ta may be replaced entirely or in part by Nb in the cemented carbide, Iio does not disclose any example wherein the ratio of Nb content and Ta content falls within the claimed range. Iio discloses only test cases where TaC is included in amounts of 0, 2, or 17 wt%, and Nb is not included at all in these test cases. (See Iio, Tables 1 and 4). Further, no limitation on the total amount of the total content of Ta carbonitride and Nb carbonitride is taught or suggested by Iio. Consequently, the materials disclosed by Iio are not provided with the mechanical properties required for the base material of a surface coated gear cutting tool. Thus, for at least this additional reason, Iio cannot render claim 1 obvious.

With specific regard to dependent claim 3, this claim recites that the cemented carbide material has a fracture toughness at room temperature in a range of 9.5 to 13 MPa(m) $^{1/2}$. Applicants respectfully submit that Iio does not disclose a material having a fracture toughness in the claimed range. A high fracture toughness in a range of 9.5 to 13 MPa(m) $^{1/2}$ is obtained when the content of Co is in a range of 12 to 17 wt%, the β t phase comprises TiC, TiN, TaC and NbC, the content of β t excluding WC is in a range of 15 to 20 wt%, and the total content of TaC and NbC is in the range of 5 to 7 wt%. (See Specification, Tables 1 and 3). Iio does not disclose the fracture toughness of the described substrate material. However, The Examiner contends that Iio teaches a material having substantially the same composition and method of making as the claimed cemented carbide, and

thus, the material of Iio would possess the same properties as the claimed cemented carbide. However, the substrate disclosed by Iio does not have substantially the same composition as the claimed cemented carbide. The substrate of the Iio reference contains only TiC-Co-WC as indispensable components. Further, no disclosed example in Iio includes TiC, TiN, TaC and NbC in the β t phase. Accordingly, Applicants respectfully submit that Iio does not teach or suggest a cemented carbide having a fracture toughness at room temperature in a range of 9.5 to 13 MPa(m) $^{1/2}$. Thus, Iio cannot render claim 3 obvious. Accordingly, Applicants submit that dependent claim 3 is allowable for at least this additional reason.

Moreover, the cemented carbide of the present invention is used for a gear cutting tool for high speed hob cutting of steel, while the ceramic based substrate of Iio is used for manufacturing cutting inserts for cutting non-ferrous material such as Al. (See Iio, Column 3, Lines 4-10). Therefore, the ceramic based substrate disclosed by Iio is not in the same technical field as the cemented carbide of the present application, and it would not have been obvious to one skilled in the art to modify the ceramic based substrate of Iio to create a cemented carbide material that can be applied as a base material for a surface coated gear cutting tool used for high speed cutting.

In light of the foregoing remarks and amendments, Applicants submit that the cited reference fails to teach or suggest each and every feature of independent claim 1 and dependent claim 3. Applicants further submit that claims 3 and 4, which are each dependent upon claim 1, are allowable at least by reason of dependency upon an allowable base claim. Consequently, Applicant submits that the present invention is both novel and inventive over the cited references and respectfully requests reconsideration and withdrawal of the rejection of claims 1 and 3-4 under 35 U.S.C. §103(a) over Iio.

CONCLUSION

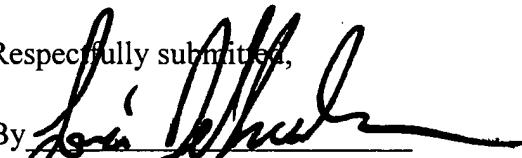
In view of the foregoing arguments and claim amendments, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

The Examiner is respectfully requested to contact the undersigned at the telephone number indicated below if the Examiner believes any issue can be resolved through either a Supplemental Response or an Examiner's Amendment. In view of the above amendment, Applicant believes the pending application is in condition for allowance.

The Commissioner is hereby authorized to charge any unpaid fees deemed required in connection with this submission, including any additional filing or application processing fees required, or to credit any overpayment, to Deposit Account No. 04-0100.

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Respectfully submitted,

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